Remarks

Applicants are submitting this Response with a check and petition for a one month extension of time. Should there be any outstanding fees not covered by the enclosed check, Applicants authorize the Examiner to charge account number 19-4516.

The Examiner rejected claims 1-19 under 35 U.S.C. §112 as containing subject matter not described in the specification. The Examiner pointed to the language of claim 1, line 6, "..dry ionomer membrane acts as an electrolyte...", as being confusing. Applicants deleted this language to overcome the rejections.

The Examiner also stated that claim 1, which recites a sensing electrode in contact with the substrate, is in disagreement with figure 1, which shows the sensing electrode to be in contact with a chip. Applicants amended all claims to claim a substrate material, where the specification describes both the substrate and chip to be of the same material, and submits that these amendments overcome the objections.

The Examiner requests support for claims 17 and 18 which call for a sensor with an opening in both the substrate material and in the ionomer. Applicant amended claim 17 to depend upon claim 1 to obviate the rejections.

The Examiner stated the embodiment of figure 6 is confusing. Because figure 6 is a cross section, it does not show the depth of ionomer 8, which depth is greater than the electrode. Therefore, gas does indeed come in contact with ionomer 8.

The Examiner rejected claims 1-19 under 35 U.S.C. §112 as being indefinite. The Examiner inquires if the apparatus claims are drawn to a sensor in the pre-operation state. Although the sensor may function where the dry ionomer remains dry, the sensor will have improved sensitivity when wetted. Therefore, the apparatus claims

are not necessarily limited to a pre-operation state since the sensor may still operate when the ionomer remains dry.

The Examiner rejected claim 11 as lacking antecedent basis and claim 14 as not being consistent with the parent claim 8. Applicants amended these claims to obviate the rejections.

The Examiner rejected claims 1-16 under 35 USC 103 as being unpatentable over U.S. Patent No. 4,812,221 to Madou, *et al.* ("Madou") in view of U.S. Patenet 5,322,602 to Razaq ("Razaq"), U.S. Patent 5,302,274 to Tomantschger, *et al.* ("Tomantschger"), or U.S. Patent 4,820,386 to LaConti, *et al.* ("LaConti"). The Examiner also rejected claims 17-19 under 35 USC 103 as being unpatentable over Madou in view of Razaq and claims 1-19 over Madou in view of Razaq or Otagawa.

All claims of Applicants' application requires a sensor made with a dry ionomer membrane. The dry ionomer membrane reduces problems associated with electrode flooding and reduces calibration time, which are problems often associated with a pre-equilibrated ionomer membrane, or a membrane wetted during sensor assembly. Traditional sensors are made with membranes that are provided in an already wet condition, and where the membranes are maintained in a wet condition from production to use by a user, and often have problems with electrode flooding and increased calibration time. See pages 1-2 of Applicants' specification. In making traditional sensors, manufacturers may also order membranes from vendors. These vendor supplied membranes are also manufactured in an already wet condition and delivered to the sensor manufacturer in a wet condition. It is believed that the membranes should be continuously wetted to avoid being damaged, as a dried membrane that is re-wetted is thought to provide less sensitivity than a continuously wet membrane. Hence, the prior art does

not use membranes that are in a dry condition, which is why Applicants' invention provides unexpected results. See page 2 of Applicants' specification.

Razaq is concerned with a traditional sensor that is improved by treating the electrolytic medium with a particular phosphoric acid, boric acid, or preselected mixture of boric and phosphoric acid. Hence, where the Examiner points to Razaq for support, namely column 6, line 50, is for changing the solution used to wet the membrane. Further support may be found in the summary of the invention. "The present invention provides an improved....solid electrolyte element that...has been treated with phosphoric acid or boric acid or a preselected mixture of boric acid and phosphoric acid..." Razaq does not teach or suggest the membrane must be dried before changing the solution. Radaq merely refers to a traditional sensor being treated while the membrane is wet with the original solution. Applicants' assertion is supported by Razaq's reference to treating or equilibrating the electrolyte element during manufacturing. Col. 6, line 49. Pre-equilibrated sensors, which are sensors equilibrated during manufacturing, relate to the traditional sensors described in Applicants' specification and which are wetted during sensor assembly and are not dry. "The entire assembly, substrate electrodes and prepared mixture, is then heated..." Col. 6, lines 62 (emphasis added). Hence, Razaq teaches away from Applicants' invention by teaching an ionomer membrane that is wetted during sensor manufacturing.

Madou also teaches away from Applicants' invention by teaching an electrolytic medium that is continuously hydrated. Col. 5, lines 60-65. Moreover, Madou necessitates encapsulating the water reservoir to keep the solution from evaporating. If Madou were presumably dry, there would be no need to encapsulate the solution to keep the electrolytic medium continuously wet. Therefore, Madou teaches the opposite of Applicants' claimed invention that requires a dry ionomer membrane.

Tomantschger also teaches a sensor that is wetted during manufacture. In fact, Tomatschger relates to a sensor that incorporates liquid electrolyte solution into the sensor during manufacturing of the sensor and after the sensor is assembled. Tomantschger does not disclose, teach, or suggest that the sensor membrane is dry at any point. "The electrolyte is retained within the third nonelectrically conductive frame member in such a manner as to substantially accommodate changes in temperature or humidity of the atmosphere. The electrolyte chambers may also extend partially into either or both of the frame members. Moreover, the electrolyte chamber may be packed with a suitable matrix...and then after the cell is assembled...a liquid electrolyte may be injected into the electrolyte chamber". Col. 8, lines 15-25.

"In the case of the electrolyte being a solid polymer or an ion conductive solid state material, an appropriate amount of electrolyte may be incorporated into the electrode during the fabrication process to facilitate wetting of the electrocatalyst. Alternatively, the finished electrode may be impregnated by the electrolyte in its liquid form-for example, DuPont NafionTM dissolved in alcohol..." Col. 6, lines 45-50 (emphasis added).

As stated on page 6 of Applicants' specification, La Conti represents the prior art having a hydrated solid polymer electrolyte sensor that has slower calibration times and increased flooding, disadvantages overcome by Applicants' invention requiring a dry ionomer membrane. Moreover, Madou, Radaq, and Tomantschger also fall into the same category, hydrated solid polymer electrolyte sensors, as La Conti for the reasons described above under each reference.

Similar to the above references, Otagawa also teaches away from Applicants' invention by teaching that the electrolytic medium is wetted during manufacturing of the sensor. Otagawa states that the electrolytic medium is encapsulated by an impermeable barrier to prevent escape and/or mixing with any analyte solution exterior of the

barrier. Col. 11, lines 50-65. Hence, no solution may enter or escape past or through the impermeable barrier. Otagawa does not disclose, teach, or suggest that the electrolytic medium is dry at any time.

In fact, Otagawa not only teaches away from Applicants' invention, but Otagawa's invention renders it impossible to have a dry electrolytic medium that may be wetted at a later time. If Otagawa was dry at any time during manufacturing, then the impermeable barrier would not be needed because if the impermeable barrier is placed over the dry electrolytic medium, solution would not be able to hydrate the medium at a later time because no solution may enter past the barrier.

Because all cited references teach away from Applicants' invention, and because there is no disclosure, teaching, or suggestion in any reference to use an ionomer membrane that is dry at any point during manufacturing, nevermind a sensor provided with a dry ionomer membrane that remains dry until a user decides to hydrate the membrane, all elements of any of Applicant's claim are not disclosed, taught, or suggested by any reference, alone or in combination with another reference without some modification.

In order for a reference to be properly modified in a rejection under 35 USC 103, there must be some teaching or suggestion to make the modification. Without some teaching or suggestion, one skilled in the art lacks the motivation to make the modification. As discussed above, all of the references not only lack a teaching or suggestion for a dry ionomer membrane, but also teach away from a sensor having a dry ionomer membrane because it is believed that a dry ionomer membrane would shorten the life of the sensor. It can hardly be argued or presumed that Applicants' dry ionomer membrane would be obvious in view of such opposite teachings.

Applicants further submit that a dry ionomer membrane is not obvious to one skilled in the art because a dry ionomer membrane is thought to negatively affect the life of the sensor. "In this manner the electrolytic medium can be kept continuously hydrated to a constant extend. This increases the lifetime of the gas sensor." See Madou Col. 5, lines 60-68. Together with the teachings of the cited art, all of which teach away from Applicants' invention, no ionomer membrane is dry at any point during the manufacturing process where it is to be wetted at a later time. Based on the foregoing, Applicants' submit that all claims are allowable and that the rejections under 35 USC 102 and 103 be withdrawn.

Respectfully submitted,

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